

THE NASA-APOLLO CONTRACTOR INTERFACE:
THE EXECUTIVE MANAGEMENT OPERATION

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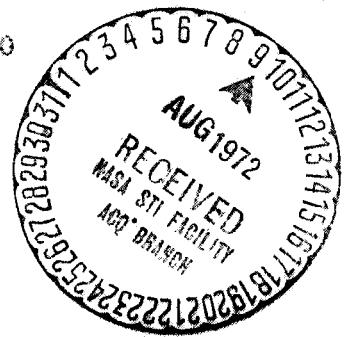
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Preface:

During the process of the research investigation of NASA-Apollo project management, it was felt that to better understand the workings of the NASA project manager, the researchers had to investigate that part of his environment known as the NASA-contractor relationships. To fulfill this requirement, research team members visited the five major contractor sites listed below:

<u>Contractor</u>	<u>Location</u>
Grumman Aerospace Corporation	Bethpage, New York
North American-Rockwell Corp.-Space Div.	Downey, California
North American-Rockwell Corp.-Space Div.	Seal Beach, California
North American-Rockwell Corp.-Power Systems Div.	Canoga Park, California
McDonnell-Douglas Astronautics Co.-Western Div.	Huntington Beach, California

It was during these visits, while talking to contractor personnel and NASA resident personnel, that it became apparent that the resident offices played significant roles in the NASA-contractor relationships. NASA resident personnel were interviewed at all sites except the North American-Rockwell Corp.-Power Systems Division (Rocketdyne).

This paper is an attempt by the author to clarify the resident office's role in the NASA-contractor relationship. This paper will also try to focus on the various problems faced by the resident manager. Several of these problems have no clear-cut solutions and, therefore, this author will not attempt to solve all the resident manager's dilemmas.

Introduction

When discussing NASA-Apollo contractor relationships, one must not overlook the significant role played by the NASA resident offices at the contractor sites. One must also recognize that in the Apollo program, there are three types of resident offices.

The first type of resident office originates from MSC. This office is part of the Apollo Spacecraft Program Office (ASPO) and is known as the Resident Apollo Spacecraft Program Office (RASPO). The ASPO program manager exerts direct line authority over the RASPO managers. The two project managers within the ASPO at the center, the manager for the LM and the manager for the CSM, only possess functional authority over the resident manager. There are three RASPO offices, located at Downey, California (CSM), Bethpage, New York, (LM), and Kennedy Space Center, Florida (Launch Operations).

The second and third types of resident offices both originate from MSFC. One resident office is part of the Saturn Program Office and the other is part of the Engine Program Office, but in both cases the resident office is known as the Resident Management Office (RMO). This paper will deal only with the RMO associated with the Saturn Program Office.

The manager of the RMO office receives his authority from the project manager instead of the program manager. It should be noted, however, that at one time the resident manager did receive his authority from the Saturn program manager.

This difference in the source of authority between the RASPO offices and the RMO office is rather significant. It is this difference that causes

a difference in the effectiveness in each office. However, this subject will be discussed later on in this paper.

The Responsibility of the Resident Office

The role and function of both EASPO and RMO is perhaps best described by referring to the definition of resident responsibility found in the MSC Blue Book of Organization Function. Some of the functions of the resident office are incorporated within this definition, which states that the EASPO offices are

Responsible for the conduct of all operations involving NASA personnel stationed at or visiting the contractor in connection with the Apollo Spacecraft Program. Responsible for program control, check-out and test, and coordinating the compatibility of ground support equipment with the spacecraft at the contractor site. Acts as the "on-site" representative of the Manager, ASPO, in the conduct of technical and administrative activities at the contractor site.

In other words, the resident manager is meant to be an extension of the ASPO program manager at the contractor's site. The EHO manager's responsibility is defined in precisely the same terms, with the substitution, of course, of "Saturn Office" instead of ASPO.

Some of the various functions that the resident manager is responsible for are spelled out in the definition; for example, functions such as program control, check-out and test, and GSE compatibility. Other functions performed by the resident office are contracting, project engineering, and management planning. Because of the responsibility for the performance of these functions, one finds that the organization of the resident office will very nearly duplicate in form the organization of the program office from which it originates. For example, the ASPO organization at MSC and the EASPO organization

at Downey, California may be compared by referring to Figure 1 and 2.

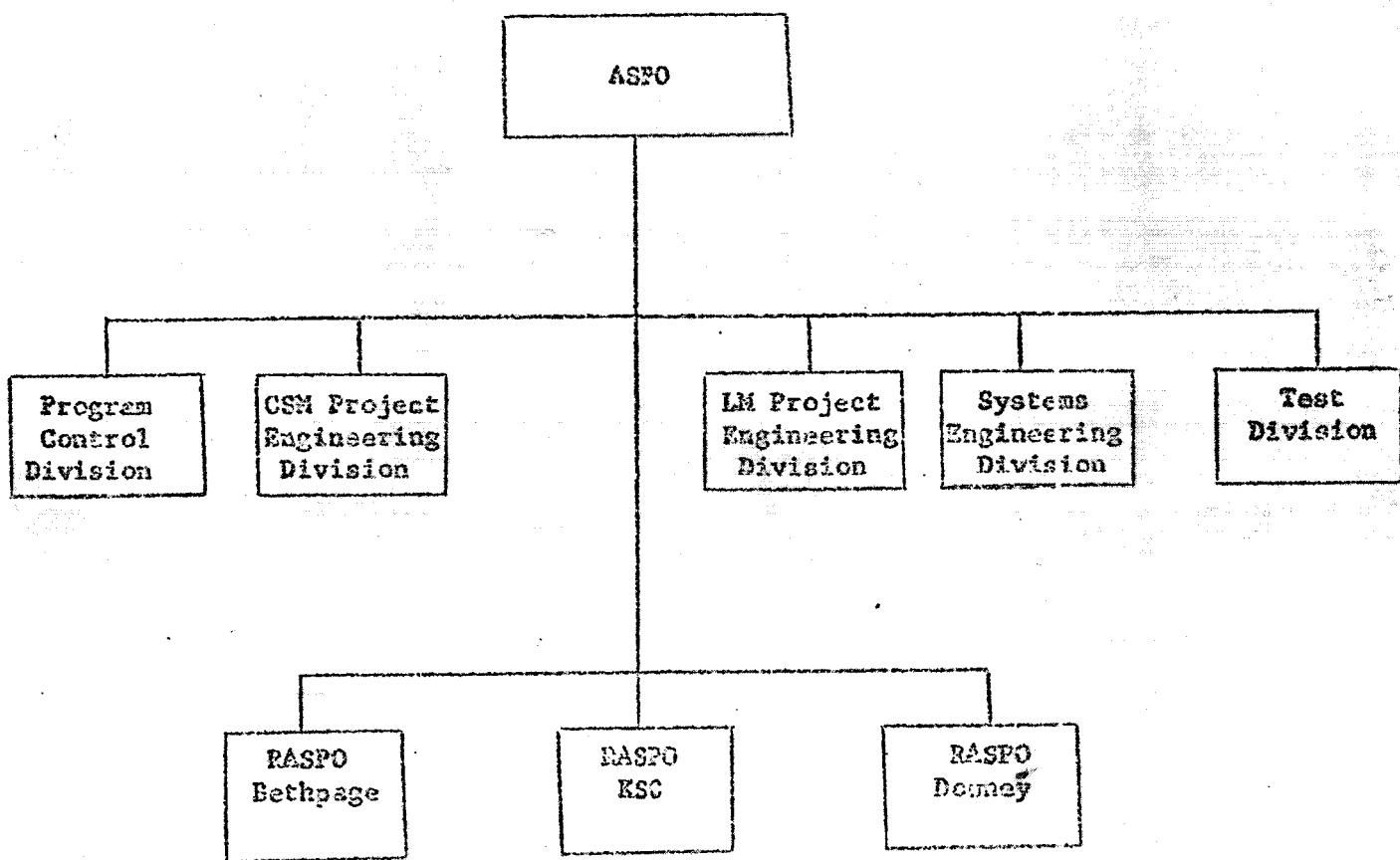


Figure 1. ASPO Organization

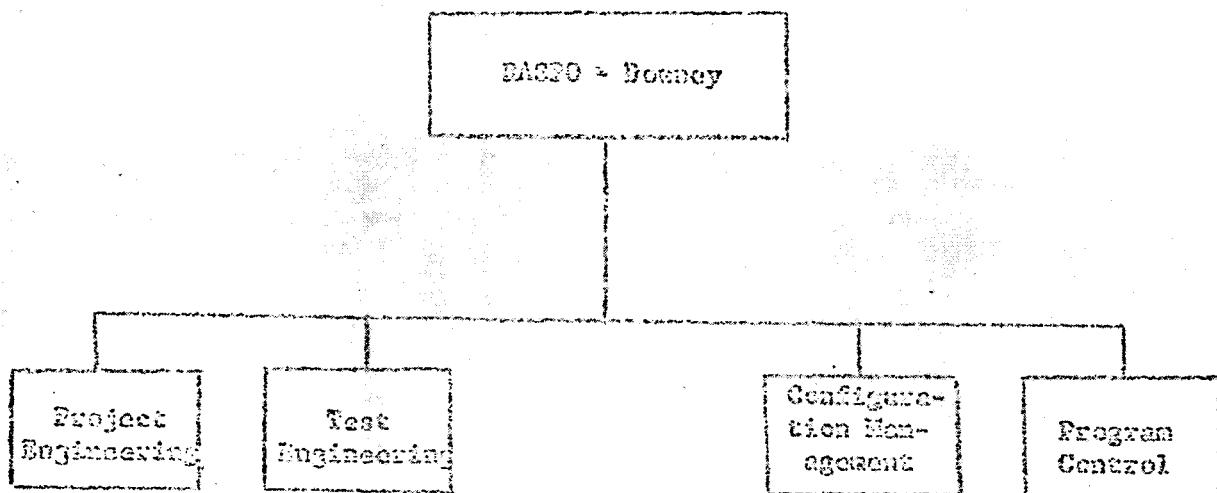


Figure 2. RACPO - Downey Organization

As can be seen, the only functional organizational difference is the absence of a LM project Engineering Office at Downey. (It should be noted that Configuration Management is part of Systems Engineering). The reason for this is rather obvious. Similarly, the RACPO organizations at other contractor sites are functionally identical to ASPO.

Despite the apparent similarity of the RACPO and ASPO organizations, differences do exist, which, for the most part, occur at lower levels of organization than shown in Figures 1 and 2. These differences are caused by the resident offices' adaptation to the contractor organization. It is at the lower levels of organization that IBM has been most successful in establishing the one-to-one counterpart relationship between contractor management personnel and IBM resident personnel. It is this situation which leads

to contractor complaints of excessive manpower in the resident office.

The Role of the Resident Office

The role of the resident office is a rather unique one in an organizational sense. Obviously, the office's primary role is to act as a representative of the center project at the contractor's site. However, this is not its complete role. In addition to being the center's representative, the resident office must become the contractor's ally and confidant. It is this seemingly paradoxical situation which leads to many of the resident manager's dilemmas.

When looking at NASA-contractor relationships one must be acutely aware of the second role of the resident office and remarks made by the contractor personnel about the resident office must be viewed with this in mind. For example, one program manager stated that he could do very well without the resident office. Yet, a member of his staff told the interviewers:

There has been many instances where they have done things for us that I am sure have enhanced our ability to get certain decisions made because, let's face it, they are closer to us than they are to their own people.

The resident office also acts as the communications link between the center program office and the contractor. It is through the resident office that all official correspondence flows. This means that the resident office becomes actively involved in any contractual changes; a very important role.

The other roles played by the resident office which are less tangible than the others, but which are nonetheless significant to the NASA-contractor relationship are: 1) the development of mutual respect between NASA as a whole and the contractor; and 2) the role of keeping the contractor alert.

Of course, the former may backfire if the contractor-resident manager interface becomes abrasive, and a mutual disdain may instead result.

Without doubt, it is this wide divergence of roles which is the source of many of the resident manager's dilemmas.

Resident Office - Contractor Problems.

It is entirely natural that upon the establishment of a sizeable resident office in the midst of a contractor's plant, the contractor will suspect that the office has been established for the primary purpose of spying on him. Although the Apollo aerospace contractors had all had previous experience with government contracting, it was for the most part concerned with the Department of Defense. The Government agencies maintained representatives on site, but almost exclusively for quality control, inspection and product acceptance purposes. With the advent of the Apollo contracts, where the contractor's work was of a highly developmental nature and schedule maintenance and extreme safety consciousness was especially important, the NASA resident personnel played a more intimate role in the contractors' affairs than ever before. It is not surprising that the contractors felt that they were living in a closely monitored, transparent environment, entirely alien to the normal concepts of company-customer relations. One contractor representative, in an interview, described this feeling as:

Working in the NASA environment is almost like living in a dictatorship. Every move that's made is witnessed and every management decision is colour-coded in silver before it's made. . . .

The feelings of animosity created in some instances by the two organizations being thrust together could be and were dissolved to various degrees by

efforts primarily on the part of the resident manager. In a sense it is he who could be considered the citizen member of the association. Theonus uses, therefore, on the resident manager to encourage and develop a sense of mutual trust between his office and that of the contractor. This complexion of the relationship is reached in time when there is mutual professional respect and complete open-handedness between the resident manager and the contractor manager, and when the latter becomes convinced that the resident office can be helpful to the contractor in accomplishing the objectives of the contract. While discussing the development of the resident office-contractor interface, one contractor manager interviewed said:

At first our Company was dismayed and dismayed at the amount of on-site customer participation...the most significant aspect of that thing which is mutual trust and the realization that it was absolutely pointless to try to play any set of cards to the rest.

Easily detectable here is the feeling of early alarm but subsequent and not altogether unhappy resignation to the situation as it exists.

But how does the resident manager go about demonstrating his utility to the contractor's organization? How does he build his credibility in the eyes of the contractor? The resident manager is in almost constant communication with the contractor, and so, therefore, aware of problems immediately as they arise. He is capable of bringing these problems to the attention of the contractor project manager, not for punitive purposes, but to seek technical, financial, or political aid as necessary. The resident manager can often expedite hurriedly needed funds which the contractor is not doing for. The resident staff can also identify problems which can be corrected at early stages. Is one manager off quality and reliability acid of the resident office at his site?

They should be here and they have a useful function. This type of second look or third look, in this case, may be good and healthy. It brings up points that are missed and from that viewpoint is good.

If the resident office's utility does not become obvious to a contractor, the contractor will inevitably and sometimes blithely resent the resident office.

A very important problem that the resident manager must direct himself to is how to orient his organization to carry out their functions by interfering with the contractor as little as possible. On too many occasions NASA has been accused of trying to do the work of the contractor. One of the severest criticisms received about the resident operation is that NASA people were looking over the shoulders of designers and making critiques of the design while still on the drawing board. If this problem is not solved, there is no possibility for any type of satisfactory resident office-contractor relationship.

The problems discussed here are really part of the overall task of establishing a viable working environment between the resident office and the contractor. They are the most important problems that face the resident manager in dealing with the contractor. Without solutions to them, the usefulness of the resident office to NASA would be very questionable.

Resident Office - Spoken Problems

Equally troublesome to the resident manager are the problems that will arise with him here below. These problems, if not solved, will also work to undermine the efficiency of the entire mission operation.

The biggest problem that the resident manager must face in this respect is how to prevent the undermining of his authority or the lack of its delegation. Undermining of authority occurs where NASA managers fail to deal with the contractor through the resident office, but deal directly with the contractor instead. In addition to undermining the resident manager by bypassing him, the NASA project manager may simply refuse to delegate certain authority despite the intent of the contractual documents. One contractor interviewed responded in this manner:

I would say that the problem that had been most severe would be the amount of authority that we could conceive that has been placed in the office. Now NASA and we have exchanged contractual documents which said he has the authority to do this and this and this and this. But there is one thing, to look at the printed word and then say now let's get into a specific thing.

The only way for the resident manager to solve this problem is to fight for the authority which has been delegated to him and to insist that center program/project personnel go through the resident office when dealing with the contractor.

The inability or lack of desire of the RMO organization to obtain the necessary delegation of authority is one of the reasons why the RMO organization is not as effective as the DAPD organization in their liaison work between center and contractors. The Huntsville program/project managers never delegated sufficient authority to their resident managers and never insisted that all official communications go through the resident office. While at Houston, one respondent stated:

They were in kind of a liaison management system and ... and ... and ... I, for one, had quite a job in developing the discipline of operation through the project office to the contractors.....

Tenaciously, should the degree of cooperation between resident office and contractor become very high, there is the danger that, viewed from the Center Program Office, the resident manager may appear to have forgotten his identity and allied himself with the contractor against the program or project manager. Given compatible personalities and lengthy service on site, it is quite possible for a strong alliance to develop. It is obvious from the quotation on page 6 that such a feeling had developed. The contractor person who is quoted indicated that he felt that the center management would prefer that the contractor deal directly with the center because the center didn't trust the resident office.

It is obvious that a delicate balance needs to be maintained by the resident manager in his intermediate role between the two principals of the contract. He must preserve his credibility with and his apparent usefulness to both. Clearly this usually will be difficult and sometimes impossible. Realization by the contractor and the program manager of the sensitivity of the resident manager's position and corresponding sympathetic behavior of the two eases not only the resident manager's problem but the problem of contractor-NASA interface, which is after all, the very same problem.

Another serious problem that the resident manager occasionally faces is becoming embroiled unwillingly in intra-center quarrels. One resident manager talking about this problem said:

Rid of got us in the middle in a lot of cases. Being put in the middle of some of those arguments was perhaps one of the most frequent differences that we found ourselves in in those days.

The most important dimension of this problem is how to protect the contractor from getting involved in those quarrels and penalizing his contract performance. On too many occasions the contractor will receive directions from one center directorate only to have that direction rescinded or confused by another center directorate. There is no clear-cut solution to this problem; none at least that the resident manager can bring about by himself.

Another area of conflict for the resident managers is center interference with the performance of specific resident office functions, i.e., monitoring of tests. This problem had been extremely severe in the early days of the Apollo program, basically because NASA didn't know what to expect from the contractors. It should be pointed out that this situation interferes with contractor operations as well as resident operations. One resident manager told us that this problem causes much trouble with the contractor:

I don't think they resent the on-site people as much as they would resent experts, either true experts or claimed experts, who would come in from my center or other places.

The list of resident office - center problems is longer still. Most of the other problems are similar to the ones already mentioned, but are not as important or as devastating in effect as those discussed.

Comparison of RASPO and RIC

From the various interviews and discussions with Center, contractor and resident personnel, one can reasonably draw the conclusion that the operations of the RASPO's have been more effective in the Apollo Program than have those of the RIC's. The reasons for this difference are several.

First of all, as has already been mentioned, the Program offices at MSC have insisted that MSC personnel work through the appropriate RASPO. On the

contrary, MSFC managers and especially laboratory personnel appear to avoid using the RMO office. So, consciously or otherwise, the RMO office is in fact undermined by Contractor personnel, whereas MSC Center or program management has strongly committed itself to BASPO support.

A second reason is to be found in the observation that BASPO managers obviously enjoy more authority than RMO managers. This may be due to the fact that BASPO authority is delegated from a higher organizational level in MSC than is the case with the RMO and MSFC. Or, perhaps, this phenomena may be related to the greater degree of authority and independence characteristic of the MSC program and project managers compared to their MSFC equivalents.

Finally, those contractors who have had experience with both Centers indicated preference for working with the BASPO's rather than the RMO's. This is surprising to some degree because BASPO is considered to be more demanding in their monitoring functions than is RMO, but at the same time it verifies the importance of good resident-contractor relations in maintaining an effective resident office.

SUMMARY

The role of the NASA resident manager at the contractor's site depends very much on the Center to which the resident manager reports. There are certain features of the role common to both Centers (MSC and MSFC), but center backgrounds do influence strongly the operations of the resident office.

The resident manager must maintain a delicate balance between the contractor and the particular Center involved. Otherwise he is beset by problems with one or the other of the principals. From their particular viewpoints, contractor personnel and resident office personnel voice complaints and criticisms of their counterparts.

A hypothesis has been set forth concerning the effectiveness of the two resident operations based on data and analysis presented in the paper. Further investigation of the Apollo Program management will substantiate or invalidate this hypothesis.